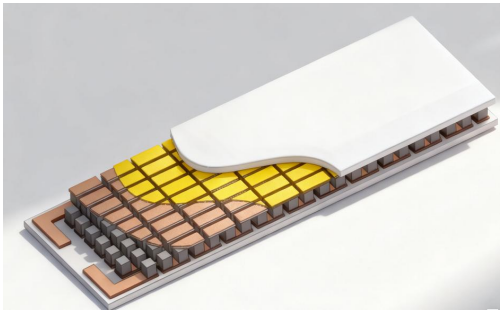
Technical Summary

TCR Bonded Process

Overview



The TCR Bonded Process uses a thermally conductive adhesive to connect key parts of a TEC. Compared with soldering, it keeps good thermal conductivity while reducing stress from temperature changes. It is ideal for rapid heating, frequent thermal cycles, and high-reliability applications. In PCR and DNA amplification instruments, it ensures consistent TEC performance and stable temperature control over time.

Performance Enhancement of the TCR Bonded Process

- Reduces Thermal Stress： Flexible adhesive absorbs stress, protecting the TEC from cracks or damage.
- Improves Reliability： Keeps TEC stable under repeated heating and cooling, extending its life.
- Fast Temperature Response： High thermal conductivity allows quick heating and cooling.
- Consistent Performance： Ensures uniform temperature across the TEC for reliable results.
- Good for Frequent Cycling： Maintains precise temperature in PCR and DNA amplification systems.

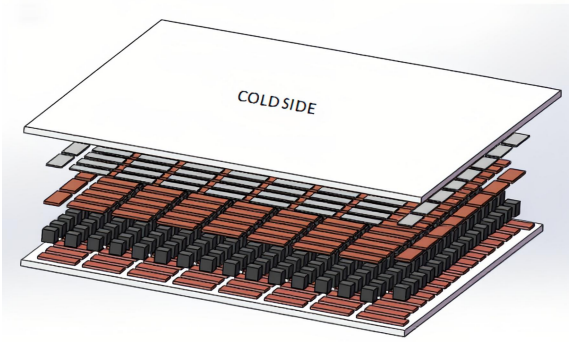
Representative TEC Models for TCR Bonded Process

These **TCR Bonded Process** TEC modules are examples for rapid-heating, high-reliability applications and are for reference only.

No.	Model No.	Th=50°C				Dimensions(mm)				
		I max (A)	Q max (W)	V max (V)	△T max (°C)	N	A	B	C	D
1	TCR-152080	8	90	22.8	78	152	16.8	74.5	77	3.3
2	TCR-071020	2	11.2	9.1	78	71	20	20	20	4.8

Electrical, mechanical, and thermal parameters can be customized based on PCR application requirements.

TEC Advantages for TCR Bonded Process



In addition to performance improvements, the TCR Bonded Process also offers these advantages:

- **Gentle Process:** Cures at low temperature, reducing thermal damage to TEC materials
- **Flexible Structure:** Suitable for bonding complex or non-flat TEC modules
- **Material Compatibility:** Works with materials having different thermal expansion coefficients
- **Customizable:** Adhesive thickness and application can be adjusted for different needs
- **Reduces Manufacturing Defects:** Minimizes solder cracks and poor connections, improving yield

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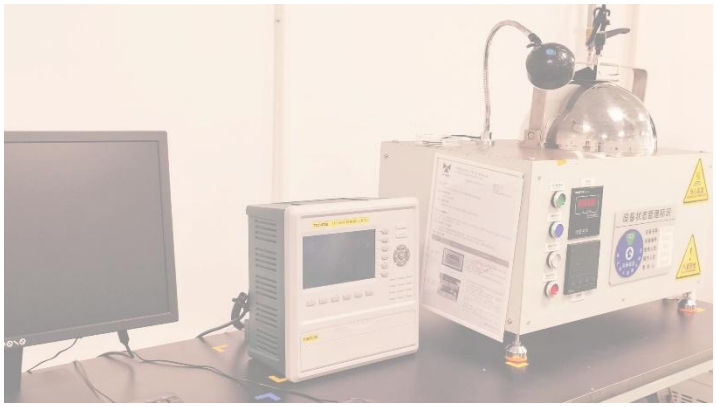
Test & Qualification Capability



Performance validation and reliability testing are conducted in dedicated laboratories, including:

- Environmental and thermal cycling tests
- Long-term stability and life testing
- Qualification aligned with **MIL-STD-883** and relevant industry standards

Test scope and qualification standards may vary depending on application requirements.

ABOUT P&N TECHNOLOGY,P&N EUROPE & i-TEC

P&N China and **i-TEC** provide thermoelectric cooling solutions for **high-end scientific and industrial applications.** P&N China focuses on large-area and system-level thermoelectric solutions, while i-TEC specializes in compact and multistage thermoelectric solutions for precision temperature control.

P&N Europe (est. 2018) supports European customers through technical sales and regional logistics coordination.

With over **20 years of experience** in thermoelectric technology, **we emphasize quality, reliability, and long-term performance** in our thermal management solutions and products.

Engineering Support & Contact

Our application engineering team provides support for:

- TEC selection and thermal modeling
- Module-level and System-level Integration
- Performance validation and reliability considerations

Contact us to discuss your thermal management requirements. Technical consultation and sample evaluation are available.

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